From Future Scenarios to Roadmapping

A practical guide to explore innovation and strategy

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FTA and Grand Societal Challenges:
Shaping and Driving Structural and Systemic Transformations

From Future Scenarios to Roadmapping: A practical guide to explore innovation and strategy

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Sponsors: Technical University of Denmark
Type: A FTA exercise with the purpose of introducing a framework combining scenarios and roadmapping
Geographic Coverage: Global. Focus on grand societal challenges, competitiveness and exploring innovation and strategy.
Scope: Technology intensive industries. Most important topics are prosperity, grand societal challenges such as scarce resources, energy efficiency, CO2 reductions, and competiveness; e.g. technology quality and cost reductions.
Applied Methods: Integration of future scenarios with technology roadmapping
Evaluation: Objectives met: To provide a guide, a practical method combining scenarios and technology roadmapping to be tested in a one or two day workshop. An on-going research topic.

Impacts: Linking scenarios with technology roadmapping initiates an exploratory and creative phase to understand and catch uncertainties. Scenarios opens op to more than one future, equally plausible, whereas roadmapping provides a framework for condensing all information in one map and timeframe – revealing windows of opportunities, thus linking decision-making with future scenarios. The link is the common understanding of challenges and establishing a common vision before moving into technology roadmapping.
Organiser: Technical University of Denmark, DTU Management Engineering and DTU Business. For further information contact authors.
Duration: One-two day workshop **Budget:** N/I **Time Horizon:** 2010-2025 **Date of Brief:** 4th of April, 2011

Keywords: scenarios; common vision; technology roadmapping; organizational learning; technological path creation

Purpose

We describe a procedure where we combine the readiness of multiple futures provided by scenarios and followed by roadmapping – a systemized decision support tool. This specific FTA-exercise, From Scenarios to Roadmapping can be performed as a one-two day workshop with the participation of 20-30 lead engineers or managers gathering intelligence in an organisation.

Background & Context

Managing technologies and strategic planning of business development goes hand in hand in today's knowledge economy. Business planning in the long run involves planning of emerging technologies as well as accounting for disruptive change in economy and society making the uncertainties immense. Both scenarios and roadmapping seems to be flexible tools fitted to deal with uncertainties. Scenario-making is one way of producing future images on what could happen in the future, in order to make

better decisions in the present. Yet, scenarios do leave one with many plausible futures and thereby making it difficult to choose which path to follow as each scenario has great uncertainties and important drivers in the storyline. Traditionally, scenarios have been developed to support formulation of a vision and mission statement driven by the most desired vision. However, scenarios have been criticized to be too distant to support strategy development. Roadmap is on the other hand a very precise tool oriented towards decision making in the present, but may exclude important uncertainties as it focus on one future. The roadmap is a way to illustrate and communicate alignments of technology and product development with market requirements and the right timing guided by a common vision [1,2]. Technology Management literature defines it as visualizing the strategy and showing the route and navigation from the current situation to the desired future [3,4].

In general, roadmapping is described as a structural, yet flexible tool when navigating in a large sea of uncertainties. However, we claim, there is a weak point in roadmapping not dealt with in foresight or roadmapping literature namely where the vision comes from. Maybe the reason for this is the fact that technology roadmapping have so far mostly been positioned within technology management where the vision is given. This may stand in opposition to strategic management, where the vision is developed. For sure a common or at least a shared vision is a strong driver for any process. Meaning that the vision may be developed by top management, but in organisations it is important to actually make it a shared vision leading to shared actions (eventually a driver for the mission-statement).

While Participatory scenario-making provides visions for multiple futures - a roadmap only operate with one vision. Our contribution with this paper is to bridge the flexibility of multiple visions of scenarios with the action-oriented roadmap.

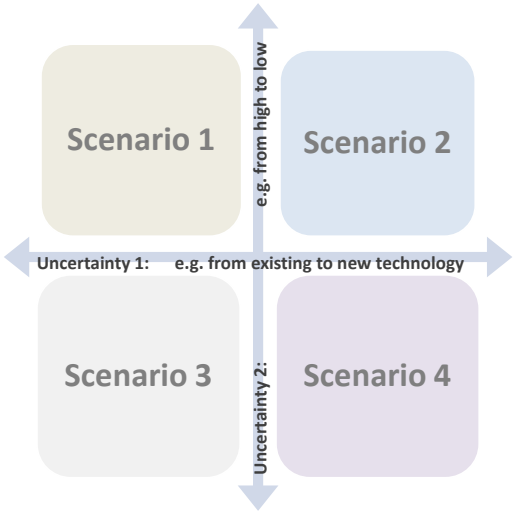
Positioning

Only a few previous studies in foresight have dealt with a practical guide linking scenarios with roadmapping. Lizaso and Reger's article from 2004 [5] provided a theoretical discussion of the value of linking roadmapping with scenarios as an approach for strategic technology planning. They describe a process step by step of a possible way to create scenarios as they opens-up to many futures, which is a valuable point. However, they also see visions as desirable pictures of the futures. Not necessarily, we claim. In line with Saritas and Aylen's article from 2010 [6] we have developed a procedure where we combine the readiness of multiple futures, thus provided by scenarios and followed by roadmapping – a systemized decision support tool. When scenario-making is linked to roadmapping we claim there is a movement from an exploratory study of possible futures towards a more goal-oriented strategic roadmap. Meaning in *this case* the scenario exercise is a playground for building visions. The common vision though constructed on the basis of the visions from the scenarios *is* the driver in the technology roadmapping, thus a guide toward a desired future.

Case of the FTA exercise

Our point of departure is a group of lead engineers, technology managers or a division involved in exploring innovation and future developments (20-30 persons) from a company – public or privat. The group has some insight in the present strategies and challenges of the company. The STEEPV model [7,8] for trends and drivers up to 2025 is used to facilitate the construction of four future scenarios. The four scenarios are constructed based on two identified uncertainties and a number of market drivers (Figure 1).

Figure 1. Four scenarios, two uncertainties



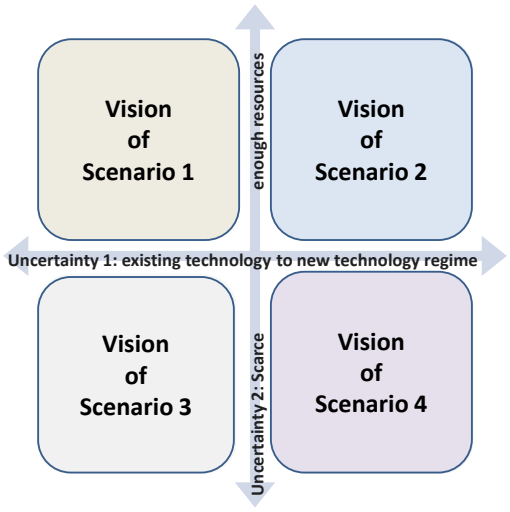
Managers justifiably involve experts in technology management to give technical and market advice, but often no one really exactly knows where the technology and the markets are heading in the long run. This is where scenario thinking becomes important because it allow for the question:

- Which set of multiple futures might be likely and how can the company prepare for all of them?

Exercise: The participants are split in four groups; a group for each scenario;

Task: The participants is asked to give the scenario a name and a short narrative formulated into a. The vision is explained as a picture of the company's position in each scenario. This result is illustrated by figure 2.

Figure 2. Four scenarios, four visions



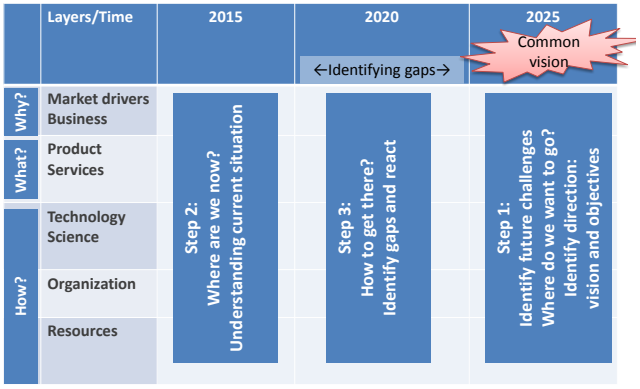
The next step is to synthesize the four visions into one common vision which the following participatory technology roadmapping exercise could build upon. Based on the four scenarios the participants develop a common vision for the firm, driving the group towards 2025 in order for the company to meet the envisaged challenges.

- A common vision is established in plenum -

The group is then introduced to roadmapping; moving from an explorative strategic landscape towards a more goal-oriented technology roadmap. In plenum the group is presented to a framework of the strategic landscape. Re-using the STEEPV-model, but this time they have a common vision and a time-line. Post-its is placed along the time-line from now up to 2025, aligning the layers as presented in figure 3. Brief comments and discussion is welcome as the post-its is placed in layers.

Figure 3. Design of the roadmap and structure

Outline adapted from [1, 9, 10].



The roadmap is in general a visual representation of layers of information related to developments of technologies in the explored context. The focus on condensing the complex information into one-page graphical framework is essentially a key-benefit of technology roadmaps, allowing for visualization of market pull and technology push and checking of consistency in alignments.

Methodology used – towards a practical guide:

Introduction to social shaping of the future and opening up to more future equally plausible via scenario-thinking:
Scenarios:
STEEPV model for trends and drivers up to 2025
Four scenarios of 2025 is constructed
Four scenarios and four visions –working in groups
Integrating these into one common vision in plenum
- *Lunch break –*

Roadmapping:
Introduction to roadmapping: In these exercises we will be working with two types: Strategic landscape and technology roadmapping.
The common vision is the driver for the roadmaps as to guide directions towards a desired future.
Strategic landscape: Exploratory. We now re-use the STEEPV- model, but now we have a timeframe and a driving vision.
Brainstorm on topics: The e.g. five highest ranked topics are selected as to explore via roadmapping.
Five technology roadmaps – one on each topic is developed in new groups. These are goal-oriented. Finally, group presentations; e.g. 10 minutes for each presentation and 10 minutes for questions to each roadmap – depending on whether it is a one or two day exercise.
In plenum: Evaluation on the exercises with facilitators.
Closure; each participant places their photo in the roadmaps on what they will be working with in the future.

Output & Impacts

From scenarios to roadmapping can be followed up by scenarios and roadmapping in an on-going process, where learning is the progress, thus the common vision is the missing link between the two tools and the context is set with the scenario-making exercise. In exploring possible futures and visions, the participants are exposed to basic assumption in foresight that the future in 20 years time is not determined, but possible to shape or possible to sense and seize opportunities. Using different scenarios in the fuzzy-end of strategy-making can give a somehow clearer picture of uncertainties. In any case it made sense to build a common

vision based on the four visions rather than starting from scratch. The common vision is then where roadmapping comes in as a systemized, yet flexible tool to support an exploratory journey in possible strategies. One of the strengths in roadmapping lies in condensing all the information into one map. It provides an overview of window of opportunities as for organizations to check if they are in due time to seize opportunities, then to direct or align resources in order to build a sustainable strategy and not just a strategy for one technology.

This exercise has tried to build in that visions are not necessarily desirable pictures of the future as worst case scenarios also needed a vision e.g. in the scenario: scarce recourses/existing technology. We have chosen to see scenarios as a creative way of inspiring innovation. Perhaps worst case scenarios such as scarce resources and an old technology regime seemed to be counted for as seizing the opportunity now to focus on such challenges in new technologies.

Content and Findings

This brief has provided an example of bridging scenario-making with roadmapping in participatory workshops. We have provided an overview of our methodology, thus a possible guide and reflections related to framework issues possibly useful for practitioners and theorists when move from scenarios to technology roadmapping.

Outcome & Evaluation

The FTA exercise was designed as participatory processes including ourselves as facilitators. It was the aim of the workshop to gather the intelligence in the group and thereby provide a conceptual framework as to systemize and visualize new insights on future challenges as well as insight from each member. The exercise was designed as to enhance social interactions among the lead technology specialists.

The learning aim from the scenarios was designed to highlight that the strategic relevance of the decisions in the presents are actually part of shaping the future, as the future in the long-term is not determined. The point of the roadmap was to provide a strategic framework for aligning market trends and drivers with technology developments and prioritizing on R&Ds. The combination of the two FTA- tools in this exercise provides insight into the value of combining these two tools: 1. Opening up to plausible futures also opens up to shaping the technology in more than one direction, 2. Synthesise into a common vision builds cohesion; 3. identify knowledge gaps in future challenges as to react in time point to windows of opportunities; 4. R&D prioritizing and alignments of technological development with market trends and drivers, as to ensure the right timing and direct or redirect resources and capabilities; point to the importance of working together in the group, divisions and even seek partner in the right time.

Our experience from using this guide also revealed; 5.the strength of a common introduction to methods and framework. All five elements are key-ingredients in wiring up the e.g. lead engineers or stakeholders in an innovation system as to align common vision with innovation efforts and building up capabilities in time to respond to market changes.

In addition, it shall be highlighted that neither roadmapping nor scenarios provides a silver bullet. Scholars such as Phaal have argued that the true value of roadmapping lies in an on-going process. The authors fall in line with this advice, as linking scenarios to roadmapping processes can be followed up in an on-going process, understanding that it is a learning process that usually reveals more questions than answers.

Conclusion on Policy Implications/Impact

An exercise like this can be done in a one-day workshop. The role of the facilitators is then of great importance. However, we would advise to let it be a two-day workshop as to give more time for the group's work and presentations. Engagements and social roles are not to be underestimated. A structured guide and systemized exercises is indeed important as to build on a common context. Combining future scenarios and roadmapping can be useful as the creativity that scenarios provide may help to provide better decisions in the roadmap's path creation.

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